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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,967	03/02/2004	Glenn A. Rinne	9180-10CT	2149

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EXAMINER
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ABOAGYE, MICHAEL

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 11/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/790,967

Applicant(s)

RINNE ET AL.

Examiner

Michael Aboagye

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-67 is/are pending in the application.
- 4a) Of the above claim(s) 34-67 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-67 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03/02/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>03/02/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-33, drawn to a method of low temperature bonding, classified in class 228, subclass 180.5.
  - II. Claims 34-67, drawn to a product of low temperature bonding, classified in class 428, subclass 548
2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made from other processes such as soldering or brazing.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Attorney Scott C. Hatfield on October 19, 2005 a provisional election was made without traverse to prosecute the invention of I, claims 1-33. Affirmation of this election must be made by applicant in replying to this

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Office action. Claims 34-67 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Double Patenting***

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-33 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-55 of U.S. Patent No.

6863209 . Although the conflicting claims are not identical, they are not patentably distinct from each other because the claimed disclosures of the low temperature method

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of bonding components and related structures of US 6863209 share common features with the low temperature method of the present application bonding components and related structures claims 1-33 of the present application. One of ordinary skill in the art would have recognized that combination of independent and dependent claims of the parent document US 6863209 now entered in the present application makes the two equivalent.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 26 and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Ecer (US Patent No.5812925).

Ecer teaches a method of bonding two components, comprising: positioning the components relative to one another to obtain a desired orientation, and bonding the two components in the desired orientation with metal wherein a temperature of both components is maintained below a melting temperature of the metal while bonding, wherein bonding comprises providing particles of the metal on the two components and bonding the metal particles; and wherein bonding the metal

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particles comprises applying pressure to the metal particles. (abstract, Figures 2 and 3, column 2, lines 36- 67)

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-4, 6-11, 13,14, 17and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ecer in view of Avery et al. (US Patent No. 6340113) and further in view of Jung (US Patent No. 6390355).

Ecer teaches a method of bonding two components, comprising: positioning the components relative to one another to obtain a desired orientation, and bonding the two components in the desired orientation with metal wherein a temperature of both components is maintained below a melting temperature of the metal while bonding; providing particles of the metal on the two components and bonding the metal particles (abstract, Figures 2 and 3, column 2, lines 36- 67); wherein bonding the metal particles comprises allowing diffusion between the metal particles; wherein the metal comprises a metal having a high diffusion rate at room temperature ( column 3, line 53 – column 4 line 30); wherein each of the particles of the metal comprises a dielectric material coated with the metal ( note that the fibers, whiskers and strengthening phases cited by Ecer have been interpreted as the dielectric core of the metal particles); providing the

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metal particles with a dielectric coating thereon wherein bonding the metal particles is preceded by rupturing the dielectric coatings (see, column 5, lines 27 – 67)(Note that the continuous oxide layer, herein considered as a dielectric layer ruptures due to the compressive force applied on the particles.)

Ecer does not expressly teach, bonding comprising plating the metal between the two positioned components; providing first and second metal particles of different diffusion rates; wherein the first metal comprises indium and the second being copper.

However Avery et al. teaches a method of low temperature joining of electronic components wherein bonding comprises electroplating or electroless plating of the bimetallic particles on the two positioned components in order to produce a uniform coating. (see column 4, lines 16 – 53 and figure 3).

Ecer in view of Avery et al. teaches all the elements of claim 1 but does not specifically teach providing a first metal with a first rate of diffusion and wherein the particles comprise a coating of a second metal with a second rate of diffusion wherein the second rate of diffusion is lower than the first rate of diffusion and that the first metal comprises Indium and the second material comprises Copper.

However, Jung et al. teaches forming a metallic contact between electronic components by providing powders of elements which form diffusion couples, wherein a first metal with a first rate of diffusion and a coating of a second metal with a second rate of diffusion wherein the second rate of diffusion is lower than the first rate of diffusion, and that the first metal comprises Indium and the second material comprises Copper (see Jung. figure 2, column 3, lines 44 - column 4 line 16), because these

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elements are intrinsically fast diffusers at room temperature, the powders consolidate rapidly to form a strong bond between the positioned components.(see Jung. figure 2, column 3, lines 44 - column 4 line 67); Jung also teaches an electronic component and substrate which comprises a well( 103) therein ( see Jung, figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have employed in the method of Ecer as modified by Avery et al., a diffusion couple comprising Indium and Copper in view of the teachings of Jung, as copper –indium in the solid state diffuse rapidly, consolidate and bond the components at low temperatures wherein induced stresses such temperature stress placed on joints, components and substrate are significantly reduced (see, Jung, figure 2, column 3, lines 44 - column 4, line 67 – column 5 line 67),

12. Claims 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ecer in view of Avery et al.

Ecer teaches all the limitations as in claims as above . Ecer does not specifically disclose the step of providing the particles in a foam.

However Avery et al. teaches forming a joint between components by providing the metal particle in a foam for the purpose of forming a thin and strong joints (Avery et al. column 12 lines 7 – 22, and figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Ecer by providing the particles in a

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foam in view the teachings of Avery et al. since this technique is particularly useful in forming thin and strong joints (Avery et al. column 12 lines 7 – 22, and figure 1).

13. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ecer in view of Catalano et al. (US Patent No. 3623231)

Ecer teaches all the limitations as in claims as above. Ecer does not specifically teach providing liquid species that amalgamates with the particles at a bonding temperature less than the melting temperature of the metal, wherein the liquid species is mercury.

However, Catalano et al. teaches a diffusion bonding method; except providing liquid species that amalgamates with the particles at a bonding temperature less than the melting temperature of the metal, wherein the liquid species is mercury, wherein this liquid species is provided to enhance wetting of the surfaces to allow low temperature bonding ( Catalano et al., Abstract and column 2 lines 1- 17).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Ecer by providing a liquid species made of mercury in view of the teachings of Catalano et al. in order to enhance wetting of the surfaces to allow low temperature bonding (Catalano et al., Abstract and column 2 lines 1- 17).

14. Claims 23- 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ecer in view of Kuwabara (US Patent No. 5967402).

Ecer teaches Ecer teaches all the limitations as in claims above . Ecer does not teach bonding the metal particles by corroding the metal particles.

However, Kuwabara teaches a method of joining members at ordinary temperature wherein bonding comprises corroding the metal particles by oxidation and or galvanic reaction, wherein oxidation reaction causes sintering and fusion of the powdered particles to consolidate into a composite material which provides a high bonding strength (see, Kuwabara, abstract and column 4, lines 4 – 40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Ecer with the metal particle corrosion technique in view of Kuwabara in order to join members at ordinary temperature by corroding the with metal particles by oxidation to produce joint of high bonding strength (see, Kuwabara, abstract and column 4, lines 4 – 40).

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Woodward (US 4059217), Minetti (US 4332341), Nazmy (US. 4676843) Taniguchi (6110605) and Rinne et al. (US 6863209) are also cited in PTO-892.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Aboagye whose telephone number is 571-272-8165. The examiner can normally be reached on Mon - Fri 8:30am - 5pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Dunn can be reached on 571-272-1171. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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